



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,485	07/23/2003	Mohamadreza Marandian Hagh	2550/167	9133
2101	7590	10/18/2005	EXAMINER	
BROMBERG & SUNSTEIN LLP			BAKER, STEPHEN M	
125 SUMMER STREET				
BOSTON, MA 02110-1618			ART UNIT	PAPER NUMBER
			2133	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/625,485	HAGH ET AL.	
	Examiner	Art Unit	
	Stephen M. Baker	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 06 August 2004.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 1 and 6-8 is/are allowed.
- 6) Claim(s) 2-5 and 9-33 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 23 July 2003 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 072904.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

DETAILED ACTION

Drawings

1. Figures 1 through 10 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to under 37 CFR 1.83(a) because they fail to show a "table of logarithm values" and "logic for obtaining, from the table of logarithm values, a logarithm ..." required by claims 2-4, 10-12, 18-20 and 26-28, or explicitly-shown corresponding algorithm steps, as described in the specification. Also not shown is the "logic for initializing" required by claims 15, 16, 23, 24, 31 and 32, and the "logic for using a sliding window" required by claims 14, 22 and 30. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures

appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

On page 6, in line 24, "logarithm of the value $L(i)$ " apparently should refer to the logarithm of the value in the square brackets, as $L(i)$ apparently represents the result of the logarithm.

On page 7, in lines 1-4, "logarithm of the value $L(d_k = i)$ " (two occurrences) and "logarithm of values above and below the value $L(d_k = i)$ " are apparently incorrect, for the same reason as noted above.

On page 12, in line 22, "estimate" apparently should be "estimated."

On page 13, in lines 6-7, ""which are non-linear operation" apparently should be "operations which are non-linear."

On page 14, in line 7, "On the other hand" is a malaprop as used and apparently should be deleted.

On page 16, in line 15, the formula for equation (25) is apparently incorrectly missing the term " H_{Δ} " found in the formula in equation (2) on page 6.

Appropriate correction is required.

Claim Objections

4. Claims 12, 13, 20, 21, 28 and 29 are objected to because of the following informalities:

Other than for being verbose, it is not apparent why the simple "extrapolation" described by three lines of text in the disclosure should require over twenty lines of text in the claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 2133

6. Claims 2-5, 10-13, 18-21 and 26-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 2: in line 5 the period apparently should be deleted; determining "the logarithm of the value $L(d_k)$ " is apparently misdescriptive, as $L(d_k)$, $d_k = +1$ and 0, is apparently already the result of determining the logarithms of the exponential terms summed in the recited formula, i.e. "the value within brackets" (p.17, line 14, etc.).

Regarding claims 3-5, 10-13, 18-21 and 26-29: reference is hereby made to the observation regarding determining "the logarithm of the value $L(d_k)$ " made above with regard to claim 2.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

8. Claims 9 and 25 are rejected under 35 U.S.C. 102(a) as being anticipated by the prior art Max-LogMAP algorithm, described by applicant.

Reference is hereby made to applicant's description of the prior art Max-LogMAP algorithm, pages 13-15 and FIG. 10, especially equations (17), which are identical to the

recited “forward recursive metric” and “backward recursive metric” approximations, $A_k(m)$ and $B_k(m')$, and equation (19), which meets applicant’s “output extrinsic Log Likelihood Ratio (LLR) values” when recited in abbreviated separated-term form as “ $L(d_k = +1) - L(d_k = 0)$,” agreeing with applicant’s FIG. 10, step 1216.

More specifically regarding claim 9, respective program (or hardware) means for performing the steps shown by FIG. 10 inherently provide “logic operably coupled to compute,” as recited, the quantities calculated by applicant’s prior art FIG. 10 algorithm.

More specifically regarding claim 25, respective program (or hardware) means for performing the steps shown by FIG. 10 inherently provide “logic programmed to compute,” as recited, the quantities calculated by applicant’s prior art FIG. 10 algorithm.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 10, 11, 14-19, 22-24, 26, 27 and 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art Max-LogMAP algorithm and the prior art turbo decoder arrangement, described by applicant.

Regarding claim 17, using the prior art Max-LogMAP algorithm as the SISO algorithm in a turbo decoder is apparently acknowledged by applicant as prior art.

Applicant further describes the conventional turbo decoder (FIG. 3) as comprising, in the well-known manner, a “first iterative decoder” (Decoder 1), a “second iterative decoder” (Decoder 2), an “interleaver” (N-Bit Interleaver) and a “deinterleaver” (N-Bit Deinterleaver). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to use the prior art Max-LogMAP algorithm as the SISO algorithm in a turbo decoder because the prior art Max-LogMAP algorithm is a known improvement over previous SISO algorithms for turbo decoding.

Regarding claims 10-13, 18-21 and 26-39, Official Notice is given that the advantages of using a table of logarithms to obtain a required logarithm in a turbo decoder were already well-known at the time the invention was made. It would have been obvious to a person having ordinary skill in the art to implement the prior art turbo decoder Max LogMAP algorithm described by applicant by using a logarithm table to perform the logarithm operations required therein. Such an implementation would have been obvious because using a table of logarithms to obtain a required logarithm in a turbo decoder was already well-known.

Regarding claims 14, 22 and 30, Official Notice is given that the advantages of applying a “sliding window” technique in turbo decoding were already well-known at the time the invention was made. It would have been obvious to a person having ordinary skill in the art to implement the prior art turbo decoder Max LogMAP algorithm described by applicant by using a “sliding window” technique. Such an implementation would have been obvious because a “sliding window” technique in a turbo decoder was already well-known.

Regarding claims 15, 23 and 31, Official Notice is given that the advantages of initializing the set of backward recursive metrics with equal probabilities were already well-known in turbo decoding at the time the invention was made. It would have been obvious to a person having ordinary skill in the art to implement the prior art turbo decoder Max LogMAP algorithm described by applicant by using backward recursive metrics initialized with equal probabilities. Such an implementation would have been obvious because initializing the set of backward recursive metrics with equal probabilities in a turbo decoder was already well-known.

Regarding claims 16, 24 and 32, Official Notice is given that the advantages of initializing the set of backward recursive metrics with the set of forward recursive metrics were already well-known in turbo decoding at the time the invention was made. It would have been obvious to a person having ordinary skill in the art to implement the prior art turbo decoder Max LogMAP algorithm described by applicant by using backward recursive metrics initialized with equal probabilities. Such an implementation would have been obvious because initializing the set of backward recursive metrics with the set of forward recursive metrics in a turbo decoder was already well-known.

Regarding claim 33, Official Notice is given that the advantages of implementing a turbo decoding by means of a microprocessor, DSP, or FPGA, were already well-known at the time the invention was made. It would have been obvious to a person having ordinary skill in the art to implement the prior art turbo decoder Max LogMAP algorithm described by applicant by means of a microprocessor, DSP, or FPGA. Any of

such implementations would have been obvious because implementation of a turbo decoder in a microprocessor, DSP, or FPGA, was already well-known.

11. Claims 12, 13, 20, 21, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art Max-LogMAP algorithm and the prior art turbo decoder arrangement, described by applicant, in view of U.S. Patent No. 5,629,884 to Pan *et al* (hereafter “Pan”).

The advantages of interpolating (“extrapolating”) between the entries of a look-up table were already well-known at the time the invention was made, as evidenced by Pan. It would have been obvious to a person having ordinary skill in the art to implement the prior art turbo decoder Max LogMAP algorithm described by applicant by interpolating (“extrapolating”) between the entries of a logarithm look-up table. Such an implementation would have been obvious because interpolating between the entries of a look-up table was already well-known, as evidenced by Pan.

12. Claims 12, 13, 20, 21, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art Max-LogMAP algorithm and the prior art turbo decoder arrangement, described by applicant, in view of U.S. Patent No. 6,182,100 to Schmookler (hereafter “Schmookler”).

The advantages of interpolating (“extrapolating”) between the entries of a look-up table were already well-known at the time the invention was made, as evidenced by Schmookler. It would have been obvious to a person having ordinary skill in the art to implement the prior art turbo decoder Max LogMAP algorithm described by applicant by interpolating (“extrapolating”) between the entries of a logarithm look-up table. Such an

implementation would have been obvious because interpolating between the entries of a look-up table was already well-known, as evidenced by Schmookler.

\

Allowable Subject Matter

13. Claim 1 and 6-8 are allowed.
14. Claims 2-5 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen M. Baker whose telephone number is (571) 272-3814. The examiner can normally be reached on Monday-Friday (11:00 AM - 7:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert DeCady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Stephen M. Baker
Primary Examiner
Art Unit 2133

smb